SYMONS'S

MONTHLY

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FOG GAUGES.

OUR first intention was to give to this article a new title, the Greek equivalent of the above, but the words do not seem to us to form a happy compound. Ομίχλη Μέτρον, or Omiklemeter, is, we think, far less likely to meet with general acceptance than was Ombrometer, and we all know how thoroughly it has been routed by the simple words "rain gauge." Hence, unless some of our readers can suggest a sonorous title, we shall leave Fog Gauges as the name of what we want.

Of late years much time and much money have been spent in recording "Duration of Sunshine"; we are not about to impugn the wisdom of that course; sunshine is undoubtedly a very important factor in the climate of any place, and we sincerely hope that some one meteorologist will make the subject his speciality, will endeavour to collect all the observations that are made, and to tabulate the results on a uniform system. It is sheer nonsense, and waste of time and money, to make observations unless there is some organization and guarantee that they will be utilized. If no one will volunteer to undertake, gratuitously, the reduction and tabulation of all these records, then the observers should discuss what is best to be done. We believe that from 50 to 100 sunshine recorders are at work in the British Isles; it may be that the Meteorological Council may consider this a subject for which they might make a grant from their £1,000 for special researches; and we think that recorders of sunshine would do well to ascertain the views of the Council on the subject. Should the Meteorological Council decline to do more than discuss the records of the instruments which they have themselves established, we think that the observers should (always on the hypothesis of no one volunteering to do the work) make a small uniform subscription, and engage a computer to discuss the whole of the records. But this hypothesis of the Meteorological Council printing one analysis of the records obtained by themselves, and of somebody else printing another analysis of other records, would be a terrible specimen of how *not* to obtain the best results from existing material.

We have treated this matter at some length for two reasons: (1) because the subject is nearly new, and at present is easily grasped

and organized, but if the observations are left uncollected they will soon become too voluminous for any one to deal with, and they will be *wasted*; (2) because the subject to which we wish to draw attention is precisely parallel, differing only in the fact that we see no reason for the apparatus costing a quarter of what a sunshine recorder costs, and if so the observers are sure to be more numerous, and the necessity for a perfect organization to collect and tabulate the records greater proportionately.

Some persons are quite content when they have made an observation and entered it in their book, and if they have sent a copy of it to any society or public body they feel that they have done a meritorious act. So, to a slight extent, they have; but until those observations are tabulated and discussed, what is the world the better?

For this reason we are always extremely careful never to ask for (and we not infrequently actually refuse) observations, unless we are prepared to give the time and thought needful for their discussion.

Our main object in the foregoing remarks has been to state clearly our views upon the important subject of the utilization of observations, and to emphasize the statement that, while we hold the subject (on which at last we are about to enter) to be of high importance, we do not invite any one to commence observations until a definite arrangement has been come to as to the collection, discussion, and publication of the results.

It has long appeared to us a matter for regret that no systematic records have been kept of the amount of fog, and that examination has been almost entirely buried under vituperation. We can recall scarcely any articles or treatises on the subject of fog-distribution except three short papers, two in the *Reports of the British Association* for 1861 and 1862, and the other an abstract of a Friday evening lecture by Dr J. H. Gladstone, F.R.S., on "Fogs and Fog Signals," in the *Proceedings of the Royal Institution*, 1863.

Bearing in mind the difficulty of obtaining a copy of the latter paper, and the exceptional fitness (if the expression is permissible) of Dr. Gladstone (both from his scientific skill, and from his position as one of the Royal Commissioners on Lights) to treat this subject, we reprint the more meteorological portion of the paper as a basis for our plea for Fog Gauges.

ON FOGS AND FOG SIGNALS, BY J. H. GLADSTONE, ESQ., Ph.D., F.R.S.

"During the course of the inquiry made by the Royal Commission on Lights, Buoys, and Beacons, the attention of my colleagues and myself was called to the fog signals which form part of the apparatus of many lighthouses, and of all British light-ships. In the report we expressed our conviction, 'that they are not sufficiently powerful, and recommend the provision of a more efficient warning in fog as subject of investigation and experiment.' About the same time, some scientific men in Ireland stirred in the matter, and induced the

British Association to appoint a committee, at the head of which is the Rev. Dr. Robinson, of Armagh, to bring the importance of the subject more directly under the notice of the legislature. These circumstances led me to turn my attention to fog; and I propose now to lay before you some of the results arrived at, with reference both to the meteorological phenomenon itself, and to the means adopted for preventing its disastrous consequences among the vessels that sail along our shores.

"I have received voluminous returns of the occurrence of fog at about 250 stations, for which I am indebted to the kindness of the three general Light-house Boards,—the Trinity House, the Northern Commissioners of Lighthouses, and the Ballast Board of Dublin; also to the Board of Trade, through Admiral Fitz Roy; and to Mr. Glaisher. I wish here also to express my thanks to several gentlemen who have aided me in the preparation of this discourse, especially Mr. Alexander Cuningham, who has just read a paper on the subject at the Royal Scottish Society of Arts, and to our friend Professor Wheatstone.

Fogs.

"A fog is simply a cloud resting on the earth. In the first discourse of the present season, Professor Tyndall explained the formation of clouds from the aqueous vapour in the atmosphere; and defined a cumulus as 'the visible capital of an invisible column of saturated air.' A fog is the capital without the column. It is the moisture evaporating from the warm earth, or river, or sea, condensed at once by the colder air. Mr. Glaisher told us here how, from his lofty position in the balloon, he saw a fog following all the windings of the Thames. This is a frequent observation, and it reminded me of a scene from the summit of the Righi one morning last summer. There lay in the valley of the Reuss a mist like a white sheet on the ground, but as the sun began to exert his power, and a light breeze to spring up, the uniform layer began to break into regular masses, and soon far beneath us there stretched a cirrus cloud, identical in aspect with those we so often see in the highest regions of the atmosphere.

"Fog, then, is composed of minute particles of water, most likely in a globular form, for there seems to be no ground for the popular notion of vesicles of vapour. Smoke enters largely into the composition of that peculiar yellow fog which visits London a few times each year—a fog of wonderful darkness and quietness, and strangely bewildering.

"This condensed vapour has a great effect in obstructing the passage of light; the sun himself cannot look through it. A slight mist seems to attack principally the more refrangible rays of the spectrum, so that the light appears redder than usual. I once analysed with a spectroscope the rays which reached Worthing from the great revolving light on Beachy Head, twenty-eight miles distant, and found that those only situated between Fraunhofer's lines C and F were transmitted. This was on what would be called a clear summer night. An objection has been raised against the orange-red glass used in many of the French lighthouses, that in misty weather all bright lights are reduced very nearly to that colour, and thus the distinction is lost; a misfortune that could hardly happen with the deep-red glass employed for the red lights of the British Isles. When the sun shines through a cloud or mist, we do not detect those atmospheric lines which make their appearance when his disk is near the horizon. Yet I have observed in London, when the sun at a

considerable altitude loomed red through a slight fog, that the characteristic C 6, δ, and η were visible.

"There is, of course, every conceivable gradation between the lightest haze and the densest fog, and it is a difficult matter to draw a line of distinction between fog and mist. The value of the meteorologieal returns in my possession depends greatly on this, and there is reason to fear, even from internal evidence, that one lighthouse keeper calls by the name of fog what another keeper thinks sufficiently described as mist or haze. Yet these keepers have a certain general sentiment and similarity in their way of thinking, and with many the practical definition of a fog is when it is necessary to sound the signal. Among amateur observers on land the greatest discrepancy prevails; but nautical men seem to have a general agreement as to what amount of thickness is to give a claim to the designation fog. For such observations Mr. Cuningham suggests that a pole, painted vermilion, should be set up at a hundred yards from the station, and that such an amount of mistiness as renders it invisible should alone be named fog. The colour of the pole should, of course, be in strong contrast to the objects behind it. This definition is somewhere about that practically adopted by seamen; it has been accepted by Mr. Glaisher, and it is hoped that it will be generally adopted by all observers.

"From the returns received, the following deductions may be drawn:—

"I. While many fogs are quite partial in their character, others cover a large extent of country. The irregular distribution of a London fog is a matter of frequent observation. Thus, last Tuesday, the day of the royal wedding, one of the densest yellow fogs obscured Westminster, whilst at Bayswater there was nothing more than a murky mist. The long-continued fog of November last in London, extending from the 19th to the 25th, was observed also at Berkhampstead, Oxford, and Banbury, but other parts of England seem to have been clear. The occurrence of fog at the lighthouse stations all round the coast during the first six months of the year 1861 has been especially studied, and the fogs of that April have been represented on a map. Some of them cover large portions of the British Isles. For instance, that of the 14th stretched all round Ireland, except the south-west corner, crossed the Irish sea to the headlands of Wales and the south-western isles and coasts of Scotland, and made its appearance again across the mainland in the Firth of Forth.

"II. Some months are marked by fogs much more than others. For instance, along the south coast of England, February and September are comparatively free, while January and June are foggy months. November is notorious for fog in London, but does not seem to deserve that character elsewhere.

"III. Some years are much more visited by fogs than others. For instance, 1861 was freer than 1858 along most parts of the coast.

"IV. Different localities are very variously visited by fog. England does not deserve that pre-eminent character for mistiness which is attributed to it by the popular imagination of the Continent. The value of the returns in showing the relative distribution of fog in different places is seriously affected by the different standards in the minds of the observers, but the following points seem pretty clearly made out:—A fog is more uniformly distributed over the surface of the sea than on the adjoining coasts. Fog is not particularly prevalent about sandbanks, or low headlands; but where cliffs or high hills

catch the south-west wind just after it has swept the ocean, as at the Isle of Wight, the Start Point, Lundy Island, and the Rocks of Pembrokeshire, the numbers run very high. The highest return is from Barra Head, the southernmost point of the Hebrides, where winds surcharged with moisture from the Gulf Stream strike the cold northern rocks, and wrap them in cloud or fog."

We now have to face the practical question—What is the best mode of determining the density of a fog?

The only suggestion mentioned by Dr. Gladstone is, that by Mr. Cuningham, of a vermillion coloured post. We do not understand why it was to be vermillion. If it had been bands of red and of white, we could understand it, for red, unless strongly illuminated (which it would not be in a fog), looks black, but surely black and white would be a better contrast.

The visibility of the pole will, as is stated, depend upon the back-ground. And, therefore, in the first place, if we are to obtain uniformity, we must have a uniform back-ground, and that can be obtained only by employing an artificial one. Hence we think that a broad board painted with stripes, is better than a pole.

When there is much fog, the sun has rarely much power, but if the fog be thin, there is usually extra illumination of the southern half of the sky, and hence it will be desirable that the boards at all stations should face one way, viz., towards the South, so that they may have the greatest illumination.

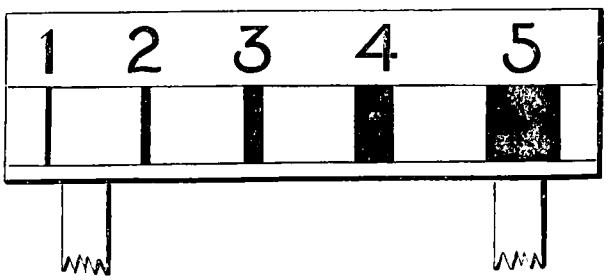
In towns it may often be impossible to have the board at a distance of 100 yards due North of the observer, and we do not think that so great a distance is needed. In some London fogs, all distinctions of colour, even of white on black varnish at less than a tenth of that distance, and we see no reason for adopting so great a distance.

It appears to us both desirable and practicable to obtain something more precise than a mere record of fog or no fog, according as one special object is or is not visible; and we should like to see an apparatus which by day or by night, would indicate no fog, slight fog, moderate fog, dense fog.

Mr. Cuningham's pole cannot be assumed to be more than 4 inches in diameter, and such a pole at the distance of 100 yards would subtend the very small angle of 3′ 49″. As already mentioned, we see no advantage in the gauge being so distant from the observer as 100 yards, 300 feet; for surely the measure of obscuration depends on the angle subtended by the object, and a black line 0·4 inch broad on a white board at a distant of 30 feet, would subtend just the same angle as one 4 inches broad at 300 feet.

As Dr. Gladstone says, that such a pole as has been proposed, seems to correspond with the ordinary definition of fog, we think it would be well to accept its equivalent or (0·27 inch) $\frac{1}{4}$ inch at 20 feet, as the breadth of No. 1 of the fog scale; and the subsequent numbers might be multiples of it, *i.e.*, $\frac{1}{4}$, $\frac{1}{2}$, 1, 2 and 4 inches. Our board should be horizontal, not vertical, so that all parts of the scale

should be under identical conditions, and it should, we think, never be less than 5, nor more than 10 feet above the ground. It would be necessary to have the scale figures painted on it to ensure the entry of the true values, and would, therefore, look somewhat as per sketch.



The measurement of the intensity of fogs at night, is far easier, because it is not complicated by the varying illumination in the day time due to clouds. We have for many years used street lamps as fog-gauges; but owing to variations in the volume of flame, they are far from perfect, and are by no means everywhere available.

It seems to us that the most simple and effective plan will be to have some small lanterns made of tin, to hold a piece of composite candle; (all such candles give an approximately equal flame), and fitted with a groove, into which could be dropped one, two, three, or four thicknesses of coloured glass. In the densest fog, such a light would even without any coloured glass be invisible at about 30 feet (perhaps at 20 feet, but we are not sure), and the density of the fog would be determined by placing the lamp at a distance of 20 feet, with all the thicknesses of glass superposed, and removing them one by one until the light became visible; *e.g.*, if when all four were in, the light could be seen, there would be no fog; with three in, it would be No. 1; with two, No. 2; with one, No. 3; with none in No. 4; and if the naked light could not be seen, it would be a maximum fog, or No. 5. Of course, all the lanterns must be alike, and the glasses of equal tints, but that could easily be arranged.

Some persons may think that the Spring is a curious period at which to suggest observations on fogs, but we consider that it is very appropriate, because it leaves ample time for considering and discussing the subject, and for preparing and fixing the apparatus, if any experiments be decided upon. We have laid our own notions before our readers, and trust that they will not hesitate to criticize them as severely as they can, because all that we desire is, that something should be done towards systematizing the records of fog.

REVIEWS.

Elementary Meteorology, By ROBERT H. SCOTT, M.A., F.R.S.; 8vo. xii–408 pages. London: Kegan Paul, Trench & Co., 1883.

SOME phrases become by repetition so hackneyed, that one hesitates to use them, but in spite of that objection, we say at the outset, that "this work supplies a long-felt want." Herschel's *Meteorology* has not been revised since 1861, and even then was a theoretical rather than practical work; and Buchan's *Handy Book of Meteorology*, second edition, 1868, has long been out of print, and extremely difficult to obtain even second-hand. "Elementary Meteorology" is sound, interesting, and cheap. Of course, there are in it a few mistakes, but the following list of those we have noticed will show how trivial they are. On page 26, it is stated that if spirit passes the mercury in a Six's thermometer the two ends will indicate different temperatures. Unfortunately, they will not, inasmuch as one scale reads upwards and the other downwards, so that a Six may be 10° wrong on both legs, and there would be nothing to show it. On page 102 we have "Cole" for "Collin." On page 132 we have one of those amusing cases which constantly occur when distinct claims of priority are enunciated—Mr. Scott alludes to this difficulty in the preface, it is a very real one, and we put matters right in all possible good humour. The author is writing concerning improvements in rain gauges, and mentions as the chief,

"the addition of a vertical cylinder on the top to retain snow when it falls, and prevent its being blown out of the gauge as would be very likely to happen if the funnel was shallow. This improvement was devised by the Meteorological Office in 1868. Such gauges are known as Snowdon gauges."

As the Meteorological Office has never had anything to do with Snowdon, we are rather surprised that the name did not suggest the possibility of the plan having some earlier origin. The fact is, Snowdon pattern funnels were designed for use in Snowdonia, and erected in 1864. The following extract from the British Association Report, 1866 (p. 344), disposes of the matter:—

"These and all other gauges in North Wales started under the joint auspices of Captain Mathew and Mr. Symons, are made with a cylinder about five inches high, rising from the rim, whereby snow is more adequately measured."

The best part of the story is yet to come, for neither of the above parties was the first to adopt the plan, it was used by Quetelet in the first half of this century, and in his *Climat de la Belgique* will be found an engraving of a Snowdon funnel. Well might Mr. Scott write in his preface, "If, in any case, full credit has not been given to the first discoverer of any principle, I must only beg him to accept my apologies for the omission."

On page 137 "St. Paul's Churchyard" should be struck out, and "Camberwell" substituted.

We said that the errors were few and trivial, and to have found only these four in upwards of 400 pages is a somewhat remarkable confirmation of our statement. The author's large acquaintance with

German Meteorological literature has added greatly to the solidity and importance of his book; for instance, the Isothermal charts of the globe have all been redrawn in accordance with the values given by Wild in his splendid work on the distribution of temperature in Russia, and large quotations have been made (duly acknowledged) from Dr. Hann's *Physical Geography* and Professor Mohn's *Outlines of Meteorology*.

Mr. Scott has done good work in writing the book; we hope that Meteorologists will do their part by reading it carefully through, and never passing a chapter until it has been thoroughly mastered.

Etude sur le climat de l'Algérie), *Température, Pression barométrique et Pluie*. Par M. ALFRED ANGOT. 4to. Paris: Gauthier Villars, 1883.

THIS is an excerpt from the Annales of the Bureau central météorologique de France, but it is complete in itself and of considerable interest—not merely to the British "swallows" who flock to Algiers in considerable numbers, but to meteorologists at large, and even to students of the general physics of the globe, for M. Angot's maps include a tract of Northern Africa and Southern Spain and Italy, including about 20° of longitude, and 5° of latitude. Here, by the bye, we have a small complaint to make. The publications of the French Meteorological Office are distinguished by general excellence of printing and paper, and most of all, by the execution of their maps, and those illustrating the present memoir fully maintain the reputation of the Bureau, but there is one too few; there should have been one showing the sites of all their stations.

The paper is divided into the following sections:—1, Physical description of the country; 2, Air temperature; 3, Atmospheric pressure; 4, Rainfall.

We cannot dwell upon the memoir at any length, but may state briefly that M. Angot has collected all the trustworthy observations which he could find, but has used those only which have been made during the period 1860-79. For that period he has determined the most important elements of the above subjects, and, as far as we have noticed, has in every case adopted the best plan for ensuring accurate results. Some of the values agree to an extent which is almost marvellous, *e.g.*, speaking of the reduction of barometric readings to their equivalent sea level pressures, M. Angot says, "The numbers thus obtained have all been reduced to sea level by the tables, which I printed in the *Annales du Bureau central météorologique pour* 1878. It may be interesting to mention that even for stations at an altitude of more than 1000 metres (3281 feet), such as Sétif, 1086 m. (3563 ft.) and Géryville 1306 m. (4285 ft.), the annual mean, reduced to the level of the sea, agrees with that at the low stations, within some tenths of a millimetre."

A tenth of a millimetre is 0·004 in., and taking the most unfavour-

able view of the case, namely, that "some tenths" should be interpreted to mean nine-tenths, that would only be 0·035 in., and although we partly share Mr. Knox Laughton's objection to sea level isobars running over mountains nearly a mile high, we congratulate M. Angot on this double-edged evidence of the goodness of his tables and of the Algerian observations.

As regards temperature, the mean temperature of the coldest month at the coldest station, excepting those on the hills, may be taken as 48°, and the mean of the hottest month at the hottest station as 90° F., which is nearly as high as any place on the globe. The precise values are, Military Hospital, Biskra, Lat. 34° 51′ N., Lon. 5° 40′ E., altitude 410 feet, mean temperature for July, based on 15 years observations (32°·2 C) 90°·0 F.

The rainfall has been observed at many more stations than the temperature and pressure. In fact, for the period under discussion, 1860-79, M. Angot has obtained rain records from 57 stations, each of the average length of 13 years, or a total of 735 yearly records. We should have been glad to see a table containing all the perfect yearly totals, as, although the period is not very long, it would have been both interesting and useful to have seen whether any, and if so what, regularity could be traced in the sequence of wet and dry years; in short, to have enabled us to bring down to 1879 a table analogous to the one on pages 50-51 *Meteorological Magazine*, Vol. V., 1870, which we converted from a memoir by Prof. Raulin. We should also have been glad of a column stating the height of all gauges above the ground.

M. Angot's attention has been devoted chiefly to obtaining trustworthy and comparable mean monthly and yearly values, and for that purpose he has adopted the best methods possible. We, therefore, thought that it would be well to compare the results now given with the arithmetical means given fifteen years ago. Having carried out such a comparison, we are glad to find that the differences are almost always insignificant. There is one station for which the values are terribly discordant, viz., Bougie, of which M. Raulin gave the rainfall as 51·82 in., and M. Angot gives 40·91. The only other important differences are (1) at Algiers, for which Professor Raulin gave two records of 31 and 35 inches respectively, and M. Angot gives five returns ranging from 24½ to 30 inches, and averaging about 28 inches; (2) at Constantine, which Professor Raulin gave as 27 inches, and M. Angot brings down to 22 inches

The author has given a very useful table of the percentage of the mean yearly total which usually falls in each month, and our only regret in connection therewith is, that he did not give a sheet of curves representing the numerical values.

Lastly, we must draw especial attention to the excellent series of 40 maps, viz., Isotherms, Isobars, and Isohyetals for each month, and also for the year, as well as one map showing the average number of days with rain.

THE RECENT FLOODS IN WESTERN EUROPE.

To the Editor of the Meteorological Magazine.

SIR,—I have only just got the following return of Swiss rainfall, and regret that it is not complete.

Chexbres is about six miles East of Lausanne, and the greater part of its rainfall flows northward to the Rhine.

Oron is about six miles north of Chexbres, in the valley of the Broye, which runs northwards to Morat and the Rhine.

Both these places had more rain than Lausanne, and the fall in their district would materially affect the Rhine.

Sincerely yours.

MICHAEL FOSTER WARD, F.M.S.

Hess Strasse, Munich, March 2nd.

RAINFALL IN SWITZERLAND.

DATE.	Geneva.	Lausanne.	Chexbres.	Oron.	Montreux.	Chessel.
December 22, 1882 ...	·59	·59	·56	·62	?	·35
,, 23	·78	·73	·99	1·13	}	·62
,, 24	·13	1·02	·86	·47	} 1·82	·58
,, 25	·33	·09	·20	·07	}	·13
,, 26	·46	·47	·67	·79	·77	·60
,, 27	·93	·56	1·24	1·60	·55	·78
,, 28	·01	·44	·67	·41	?	·28
,, 29	...	...	...	...	?	...
,, 30	...	...	...	...	?	...
,, 31	·42	·03	...	...	?	...
January 1, 1883 ..	·16	·55	?	}	?	?
,, 2	·06	·04	?	}	?	!
,, 3	·03	·14	?	} 1·00 ?	?	?
,, 4	...	...	?	}	?	?
Totals from 24th ...	2·53	3·34	3.64?	4·33 ?	2·24 ?	2·37 ?
Gross total.....	3·90	4·66	5·19?	6·08	3·24 ?	3·34 ?

THE METEOROLOGICAL SOCIETY.

THE usual monthly meeting of this Society was held at the Institution of Civil Engineers on Wednesday evening, February 21st; Mr. J. K. Laughton, F.R.A.S., President, in the chair. Rev. W. R. C. Adamson, R. P. Coltman, W. F. Gwinnell, Captain C. S. Hudson, T. Mann, F. G. Treharne, and W. Tyson were balloted for, and elected Fellows.

The following papers were read :—

1 Notice of a remarkable land fog bank, "The Larry," that

occurred at Teignmouth, on October 9th, 1882," by G. W. Ormerod, M.A., F.M.S. The "Larry" is a dense mass of rolling white land fog, and is confined to the bottom of the Teign valley, differing therein from the sea fog, which rises above the tops of the hills; it appears about day-break, and has an undulating, but well-defined upper edge, which leaves the higher part of the hill-sides perfectly clear. The author gives an account, illustrated by photographs, of the remarkable fog-bank that occured at Teignmouth, on the morning of October 9th.

2. "Barometric depressions between the Azores, and the continent of Europe," by Captain J. C. de Brito Capello, Hon. Member M.S. The author gives the tracks of several depressions from the Azores to Europe, and shows that if there had been a telegraphic cable, the arrival in England of nearly every one of them could have been foretold.

3. "Weather Forecasts and Storm Warnings on the coast of South Africa," by Captain C. M. Hepworth, F.M.S.

4. "Note on the reduction of Barometric readings to the gravity of latitude 45°, and its effect on secular gradients, and the calculated height of the neutral plane of pressure in the tropics," by Professor E. D. Archibald, M.A., F.M.S.

FISHERY BAROMETERS.

To the Editor of the Meteorological Magazine.

SIR,—Turning over an old "Mechanics' Magazine" (vol. xxx. p. 30) last evening, I came upon a letter signed "F.R.S.," suggesting that public barometers should be placed in conspicuous positions in seaport towns and fishing villages. The date is 1838, which seemed to me early. The writer stated that he had seen such a barometer at Geneva.

In a subsequent number (vol. xxx. p. 52) "Nauticus" writes to say that he has seen fishermen and others habitually consulting the barometers in opticians' shops, so that the establishment of public instruments would no doubt meet a want.—Yours very truly,

RICHARD B. PROSSER.

31, St. Paul's Road, March 9th, 1883.

CLIMATOLOGICAL TABLE FOR THE BRITISH EMPIRE, OCT., 1882.

STATIONS. (*Those in italics are South of the Equator.*)	Absolute. Maximum. Temp.	Absolute. Maximum. Date.	Absolute. Minimum. Temp.	Absolute. Minimum. Date.	Average. Max.	Average. Min.	Dew Point.	Humidity.	Absolute. Max. in Sun.	Absolute. Min. on Grass.	TotalRain. Depth.	TotalRain. Days.	Aver. Cloud.
	°		°		°	°	°	0–100	°	°	inches		
England, London	70·4	1	31·9	26	58·0	44·5	46·5	85	116·7	27·2	4·96	23	7·7
Cape of Good Hope	91·8	23	40·2	31	72·8	48·2	51·7	75	..	...	3·07	10	4·6
Mauritius	78·7	21	66·1	27	77·8	68·6	61·6	69	...	...	·91	18	5·1
Calcutta	90·6	10	67·6	22	85·6	73·9	74 0	85	155·9	58·0	11·08	9	4·5
Madras	...	...	...	...	...	...	...	...	...	...	...	...	...
Bombay	91·5	26	71·0	30	87·0	75·0	73·6	78	149·0	59·2	1·12	3	2·9
Ceylon	87·6	20	72·8	24‡	84·7	76·0	71·9	75	150·6	68·0	11·72	21	8·0
Melbourne	86·0	16	36·1	11	69·5	47·9	44·8	64	138·0	27·2	2·04	8	4·8
Adelaide	94·8	30	39·4	3	73·8	51·1	46·8	56	158·8	34·5	1·65	11	4·5
Wellington	67·0	11	40·0	7‖	59·1	46·6	...	..	127·0	37·0	2·68	13	...
Auckland	67·4	27	43·5	26	63·1	49·1	48·3	75	131·5	36·0	1·62	16	6·2
Falkland Isles	57·7	24	30·1	28	48·8	36·9	40·3	86	120·0	25·6	2·15	16	7·0
Jamaica	89·4	27	69·7	16	87·2	72 7	73·3	84	...	64·1	6·39	...	5·5
Barbados	86·0	21	70·0	30*	82·5	73·0	73·4	80	153·0	68·0	5·84	19	6·0
Toronto	74·3	7	28·0	20	60·5	42·6	46·0	75	140·0	21·0	1·15	8	5·2
New Brunswick, S. John	63·0	10†	31·0	12	54·1	41·7	44·1	85	...	...	3·35	12	5·5
Cape Breton, Sydney	71·8	9	30·0	13	56·1	41·7	44·5	85	...	...	5·38	15	5·6
Manitoba, Winnipeg	68·3	5	21·3	31	50·5	32·6	37·8	82	118·0	...	3·97	13	6·5
British Columbia	...	...	...	...	...	...		...	...	...	...	...	

* And 31. † And 16. ‡ And 26. ‖ And 25.

REMARKS, OCTOBER, 1882.

Cape of Good Hope.—Mean temp. about 4° below the average; rainfall 2 in. in excess of the previous October. D. GILL, F.R.S.

Mauritius.—Rainfall ·76 in. below the average; mean temp. 0°·8 above it; mean pressure, 30·139 in.; mean hourly velocity of wind 12·3 miles, extremes 30·3 miles and 3·2 miles; prevailing direction E. by S. C. MELDRUM, F.R.S.

Melbourne.—Mean temp. 0°·7 above the average; mean pressure and humidity about the average; temp. of dew point, amount of cloud, and rainfall all considerably below it; prevailing direction of wind S.E. and S.; strong breezes on eight days; dense fog on 9th; hoar frost on 11th; heavy dew on three days; L on 9th and 22nd; Aurora Australis on 2nd and 6th. R. L. J. ELLERY, F.R.S.

Adelaide.—Mean pressure (29·995 in). and temp. about the average; rainfall ·16 in. below it. Over the settled district the rainfall was about the average; in Central Australia it was heavier than usual, and many stations in the north had treble the average. C. TODD.

Wellington.—Windy and wet till 6th, generally fine from 7th to 21st, and the remainder of the month was showery with one or two fine days. On the 4th 1·10 in. of rain fell; N.W. winds prevailed on fourteen days; T on 22nd; slight earthquake on 20th; brilliant meteors on 29th and 30th. R. B. GORE.

Auckland.—Weather mostly fine, but with high wind throughout the month from S.W., occasionally veering to W. or S.; little R; temp. 1°·5 below average; bar. mostly high. E. B. DICKSON.

Falkland Isles.—Last week of month unusually cold and stormy. F. E. COBB.

BARBADOS.—Mean pressure below the average; mean temp. (77°·0) same as the average; average velocity of wind 7·5 miles per hour, extremes 16 miles and 1 mile, rainfall 62 per cent., and evaporation 36 per cent., above the average. Sixteen days were overcast; TSS on 5th; L on 12th, R. BOWIE WALCOTT.

CAPE BRETON.—On 19th 1·71 in. of R fell. C. CARPMAEL.

SUPPLEMENTARY TABLE OF RAINFALL, FEBRUARY, 1883.

[For the Counties, Latitudes, and Longitudes of most of these Stations, see *Met. Mag.*, Vol. XIV., pp. 10 & 11.]

Div.	STATION.	Total Rain.	Div.	STATION.	Total Rain.
		in.			in.
II.	Dorking, Abinger	5·19	XI.	Llanfrechfa Grange	4·99
,,	Margate, Birchington...	2·44	,,	Llandovery	6·71
,,	Littlehampton	3·68	,,	Solva	3·48
,,	St. Leonards	3·41	,,	Castle Malgwyn	9·35
,,	Hailsham	4·30	,,	Rhayader, Nantgwillt..	9·86
,,	I. of W., St. Lawrence.	3·43	,,	Carno, Tybritle	5·12
,,	Alton, Ashdell.....	6·61	,,	Corwen, Rhug	4·52
III.	Great Missenden.....	4·53	,,	Port Madoc	4·53
,,	Winslow, Addington ...	4·01	,,	I. of Man, Douglas	2·36
,,	Oxford, Magdalen Col...	3·60	XII.	Carsphairn	8·40
,,	Northampton	3·26	,,	Melrose, Abbey Gate...	2·97
,,	Cambridge, Beech Ho...	2·39	XIII.	N. Esk Res. [Penicuick]	1·60
IV.	Southend	1·93	XIV.	Ayr, Cassillis House ...	3·31
,,	Harlow, Sheering	3·55	,,	Glasgow, Queen's Park.	...
,,	Diss	2·37	XV.	Islay, Gruinart School..	4·83
,,	Swaffham	3·19	XVI.	St Andrews, Newton Bk	3·72
,,	Hindringham	3·20	,,	Aberfeldy H.R.S.	7·53
V.	Salisbury, Alderbury...	4·89	,,	Dalnaspidal	6·83
,,	Warminster	5·12	XVII.	Keith H.R.S.	2·16
,,	Calne, Compton Bassett	3·98	XVIII.	Forres H.R.S.	1·47
,,	Beaminster Vicarage ...	5·63	,,	Strome Ferry H.R.S....	6·35
,,	Ashburton, Holne Vic..	12·38	,,	Lochbroom	5·44
,,	Torrington, Langtree W.	5·49	,,	Tain, Springfield.....	1·13
,,	Lynmouth, Glentnorne.	7·62	,,	Loch Shiel, Glenaladale	13·56
,,	Probus Lamellyn.....	7·04	XIX.	Lairg H.R.S.	...
,,	Taunton, Fullands	4·68	,,	Forsinard H.R.S.	2·80
VI.	Bristol, Clifton	4·00	,,	Watten H.R.S.	1·88
,,	Ross	4·33	XX.	Fermoy, Glenville	8·11
,,	Wem, Sansaw Hall.....	1·91	,,	Tralee, Castlemorris ...	8·06
,,	Cheadle, The Heath Ho.	2·19	,,	Tipperary, Henry Sreet	...
,,	Worcester, Diglis Lock	3·07	,,	Newcastle West	5·27
,,	Coventry, Coundon	3·50	,,	Kilrush	...
VII.	Melton, Coston	3·10	,,	Corofin	5·59
,,	Ketton Hall [Stamford]	3·05	XXI.	Carlow, Browne's Hill..	4·96
,,	Horncastle, Bucknall ...	2·90	,,	Navan, Balrath	2·74
,,	Mansfield, Market Place	3·36	,,	Athlone, Twyford	5·45
VIII.	Macclesfield, The Park	2·29	XXII.	Mullingar, Belvedere ...	3·81
,,	Walton-on-the-Hill... .	1·82	,,	Clifden, Kylemore	12·23
,,	Lancaster South Road..	3·05	,,	Crossmolina, Enniscoe..	6·46
,,	Broughton-in-Furness ..	6·14	XXIII.	Carrick-on-Shannon ...	3·18
IX.	Wakefield, Stanley Vic.	1·76	,,	Dowra	...
,,	Ripon, Mickley	3·09	,,	Rockcorry.....	2·84
,,	Scarborough.....	2·58	,,	Warrenpoint	4·63
,,	East Layton [Darlington]	2·28	,,	Newtownards	4 23
,,	Middleton, Mickleton ..	3·75	,,	Belfast, New Barnsley .	3·68
X.	Haltwhistle, Unthank..	2·46	,,	Bushmills	3·28
,,	Shap, Copy Hill	7·97	,,	Buncrana	3·19

FEBRUARY, 1883.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1870–9	Greatest Fall in 24 hours. Dpth	Date	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date.	Min. Deg.	Min. Date.	No. of Nights below 32° In shade.	On grass.
			inches	inches.	in.								
I.	ENGLAND.	London (Camden Square) ...	3·62	+ 1·98	·60	8	14	57·3	28	29·3	17	4	12
II.		Maidstone (Hunton Court)...	3·43	+ 1·81	·63	8	19	...	...	...	...	...	...
,,		Strathfield Turgiss	3·88	+ 2·13	·70	10	15	54·4	21*a*	24·2	16	6	19
III.		Hitchin	3·79	+ 2·19	·77	2	19	51·0	22*b*	28·0	16	9	...
,,		Banbury	4·78	+ 2·94	1·04	10	17	54·0	22	29·0	1	6	...
IV.		Bury St. Edmunds (Culford)	3·35	+ 1·58	·59	2	18	54·0	21*b*	27·0	15	10	..
,,		Norwich (Cossey)	2·73	+ ·98	·43	10	15	57·5	24	28·5	1	6	11
V.		Bridport	4·43	...	·94	10	15	...	..	...	...	...	...
,,		Barnstaple.....	5·27	+ 2·08	1·06	1	23	55·0	15	30·5	1	...	...
,,		Bodmin	9·24	+ 4·37	2·00	1	22	50·0	14	27·0	1	3	10
VI.		Cirencester	3·96	+ 1·32	·58	10	18	..	...	...	...	...	...
,,		ChurchStretton(Woolstaston)	4·22	+ 1·72	·61	1	20	56·0	21	27·0	1	3	16
,,		Tenbury (Orleton)	3·35	+ ·88	·68	1	18	57·5	24	29·0	16	5	15
VII.		Leicester	3·19	...	·69	10	20	57·0	24	31·5	16	2	16
,,		Boston	3·20	+ 1·42	·71	11	14	55·0	21	28·0	1	...	...
,,		Grimsby (Killingholme).....	2·79	+ ·99	·69	10	18	55·0	21	31·0	1, 15	2	...
,,		Hesley Hall [Tickhill].....	2·29	...	·39	10	17	58·0	25	25·0	1	5	...
VIII.		Manchester (Ardwick).....	1·62	— ·57	·39	11	15	55·0	21	28·0	1	5	...
IX.		Wetherby (Ribston Hall) ...	2·34	+ ·19	·37	8	12	...	...	...	...	...	...
,,		Skipton (Arncliffe)	6·46	+ 1·82	1·34	17	23	53·0	25	30·0	...	...	...
X.		North Shields	1·52	— ·32	·57	1	16	57·2	21	28·5	1	7	7
,,		Borrowdale (Seathwaite).....	18·20	+ 6·75	1·93	9	28	51·1	25	26·0	1	5	...
XI.	WALES.	Cardiff (Ely).....	3·93	+ ·27	·68	17	20	...	...	...	...	...	...
,,		Haverfordwest	6·36	+ 1·91	1·12	17	20	52·0	20*c*	30·0	8	6	10
,,		Plinlimmon (Cwmsymlog) ...	5·10	...	·54	9	22	...	...	...	...	...	...
,,		Llandudno.....	2·78	+ ·49	·53	13	18	54·8	21	32·2	1	...	...
XII.		Cargen [Dumfries]	4·78	+ ·97	·98	1	19	52·6	21	28·4	1	3	...
,,		Hawick	3·36	+ 1·07	·55	13	20	...	...	..	...	...	...
XIV.		Douglas -Castle (Newmains)	4·67	+ 1·50	·62	9	21	...	...	...	...	...	...
XV.		Lochgilphead (Kilmory).....	7·94	+ 3·55	1·71	21	24	...	...	29·0	9	7	...
,,		Appin (Airds)	5·86	...	...	...	...	...	...	...	...	...	.
,,		Mull (Quinish).....	8·16	...	1·58	17	26	...	...	...	..	...	...
XVI.		Loch Leven Sluices	2·40	— ·56	·60	2,3	9	...	...	...	...	...	...
,,		Arbroath	2·89	+ ·73	·66	17	16	53·0	24	30·0	1	4	...
XVII.		Braemar	6·11	+ 3·44	1·04	2	21	50·0	21	24·2	11	7	17
,,		Aberdeen	4·14	...	1·16	17	20	59·0	21	30·0	1	3	...
XVIII		Skye (Sligachan)	15·76	...	2·52	17	24	...	...	...	...	..	...
,,		Culloden	1·78	+ ·73	...	...	...	53·0	24	26·5	2	4	20
XIX.		Dunrobin	1·90	...	·38	26	11	52·2	24	28·0	19	...	...
,,		Orkney (Sandwick)..... ..	3·46	+ ·91	·85	2	19	47·8	24	31·8	2, 11	2	7
XX.	IRELAND.	Cork (Blackrock)	9·10	+ 4·51	2·07	16	18	56·0	27*b*	28·0	18*d*	10	...
,,		Dromore Castle	8·97	...	1·15	6	19	56·0	28	30·0	8*e*	6	...
,,		Waterford (Brook Lodge) ...	6·83	...	1·46	1	18	54·0	25*b*	22·5	1	8	...
,,		Killaloe	5·43	...	·84	1	19	60·0	28	26·0	1	12	...
XXI.		Portarlington	2·63	+ ·42	·48	6	17	57·0	21	28·5	1	4	...
,,		Dublin (FitzWilliam Square)	3·75	+ 1·59	1·01	1	17	57·9	21	29·1	19	2	7
XXII.		Ballinasloe	4·49	+ 1·98	·65	16	24	54·0	28	26·0	1	14	...
XIII.		Waringstown	3·02	+ ·77	·48	11	17	55·0	21	28·0	18	7	11
,,		Londonderry (Creggan Res.).	3·19	...	·75	17	23	...	...	...	...	...	...
,,		Omagh (Edenfel)	3·40	+ 1·12	·84	17	22	51·0	21*b*	29·0	18	9	...

\+ Shows that the fall was above the average ; — that it was below it.

a And 24. *b* And 28. *c* And 21. *d* And 22. *e* And 9, 12, 18, 21.

METEOROLOGICAL NOTES ON FEBRUARY.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

STRATHFIELD TURGISS.—The first three parts of the month wet and cold, the last week bright, fine, and dry. Flood water subsiding, and should the weather continue fine, the spring sowing may begin at last; a state of affairs wholly unparalleled in the history of this country's agriculture. Honey bees at work on 8th; white violets in flower on 13th; daisy on 18th; white dead nettle on 21st; buttercups on 26th.

BANBURY.—Very stormy during the first half of the month; weather unusually mild, but vegetation not forward; whitethorn hedges in bud at end of month; mean temp. 42°·2, bar. at noon, on 23rd, 30·815 in., high wind on eight days, very wild on 14th; floods on 3rd.

CULFORD.—Very wet during the early part of the month, preventing outdoor pursuits, wheat perishing from excessive wet; the close of the month was fine, but there was very little sunshine.

BODMIN.—Mean temp. 43°·9; rainfall much the greatest registered here in February; on 24th, bar. rose to 30·870 in., the highest point I have registered during 24 years.

CIRENCESTER.—A mild month, with excessive R and floods.

WOOLSTASTON.—Constant gales, rain, and floods during the earlier part of the month; the last week was very fine, and the land beginning to dry rapidly by the end of the month; mean temp. 41°·6.

ORLETON.—S fell on the night of February 1st, changing to R, which filled the rivers; the weather continued very rainy till the 20th, with occasional sunshine, but only three days without R, the land being perfectly saturated, and the rivers frequently overflowing. After the 20th, the bar. was very high, and the weather dry and fine. Mean temp. of the month more than 2° above the average. Lunar halos were seen on 16th, 19th, and 21st. Wheat planting became general at the end of the month.

GRIMSBY, KILLINGHOLME.—The month was very wet till the 17th, and no field work could be carried on, but after that date, the weather was dry and fine. Bar. very high on 23rd.

ARNCLIFFE.—Very stormy on the nights of the 6th and 12th.

SEATHWAITE.—Very stormy and wet from 11th to 15th; during the month there were eight falls of rain exceeding one inch in 24 hours.

WALES.

HAVERFORDWEST.—The month commenced cold, stormy, and wet, with a great depression of the bar. (9 a.m. on 2nd, 28·764), heavy squalls of R and wind occurred on the 6th and 7th, most violent from 10 to 12 p.m.; the 9th also was very stormy with heavy rainfall, and this weather continued till the 14th; two fine days of sharp frost followed, and on the 17th, another violent storm of R and wind occurred, the spring tide and flood meeting caused one of the highest floods known for several years. After the 17th, the weather gradually, but steadily improved, and from the 20th to the end of the month, the bar. was remarkably high, reaching 30·844 in., at 9 a.m. on 23rd. The third wettest February during the last 35 years.

LLANDUDNO.—A fine mild month with no frost, and both the daily and monthly range of temp. (9°·0 and 22°·6 respectively), were less than the average. Though the rainfall was half-an-inch above the average, the mean humidity of the air (83) was slightly below the average. A heavy gale occurred on the 12th. Duration of bright sunshine 87·8 hours.

SCOTLAND.

HAWICK.—A cold, wet, and windy month, strong gales from 12th to 17th. Aurora on the 24th.

BRAEMAR.—An open wet month with frequent gales of wind causing great damage to forests.

ABERDEEN.—Strong S.W. winds and gales, accompanied by heavy rains, marked the first half of the month; but after the 17th, the weather, although showery, was fine and comparatively dry. Rainfall of the month 1·70 in. above the average. Aurora seen on three nights.

SLIGACHAN.—Rather wet all the month, only four fine days, on the whole very mild; frequent gales and strong wind.

CULLODEN.—Weather generally fair, during the month R falling at intervals; no S fell, and frosts occurred only at night, and were not severe. Prevailing winds W., W.N.W. and S.W., frequently very heavy.

SANDWICK.—The rainfall of the month was above the average, the temp. was mild, but it was very stormy, there was a long-continued storm from 10 a.m. on the 6th, till 10 p.m. on 8th; velocity of wind never less than about 50 miles per hour, and about 70 miles an hour from 4 to 11 a.m. on 7th; there were gales also on 13th, 17th, 22nd, and about midnight between the 24th and 25th; S.E. winds prevailed till the 19th, and after that S.W. Auroræ seen on six nights.

IRELAND.

DROMORE CASTLE.—Perpetual storms and R prevailed during the first half of the month; the weather then gradually improved, and the last few days were very fine, with morning mists, followed by clear skies and warm sunshine. L on 7th, 12th, and 14th; S on 10th; H on 13th.

WATERFORD, BROOK LODGE.—Heavy gales prevailed during first half of the month, with R, H, and S. Rainfall much above the average. Farming operations very backward, but much was done in the last week, which was favourable.

KILLALOE.—After three weeks of constant wet and boisterous weather, the month closed with a week beautifully fine and spring like. Shannon floods up to the fullest height on 20th. S on 13th.

DUBLIN (FITZWILLIAM SQUARE.)—During the first three weeks of the month, stormy weather and heavy rains prevailed; after the 18th, fine, quiet weather (anti-cyclonic). Mean temp. 43°·4, 0°·6 above the everage of 18 years; after the 18th, only ·05 in. of R fell; S.E. gale with H on 1st; S gale on night of 12th; TS on 15th; pressure 30·802 in., at 9 a.m. on 23rd.

WARINGSTOWN.—The early part of the month was wet, the latter part very fine and drying, admitting of much lost time being made up.

LONDONDERRY (CREGGAN RES).—The month was very stormy up to the 24th, but the last four days were fine.

ERRATUM.

In the general table on page 14 (last month) for Dublin (Monkstown) read Dublin (FitzWilliam-square.)